

ASPHALT
AND
ASPHALTIC CONCRETE
BY
A. R. YOUNG, CITY ENGINEER
TOPEKA, KANSAS
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ASPHALT AND ASPHALTIC CONCRETE

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ASPHALT AND ASPHALTIC CONCRETE.

The demand for better streets and for a durable, moderate priced pavement has resulted, in the last few years, in the development of a number of bituminous pavements, each of which possess more or less merit.

The type which is proving itself to be the most economical, from the stand point of first cost, cheapness of maintenance, resistance to traffic, durability of surface and which presents the most attractive appearance, is the type known as asphaltic concrete.

This is a fine mix, bituminous pavement, and was first developed and introduced in this section of the country by the Kaw Paving Company of Topeka.

The municipalities of the state owe much to this company for the determined stand which they took in their struggle with the Warren Brothers Company when this type of pavement was in its infancy. Had they not had the courage of their convictions, and stubbornly fought to establish their rights, all of the municipalities enjoying this type of pavement today, would be paying royalties on a Warren Brothers' patent.

The decision of Judge Pollock, in the case of Warren Brothers Company, plaintiff, vs. City of Topeka, Kaw Paving Company, et al., defendants, has rendered it possible for cities to lay this type of pavement at the prevailing popular prices at which it is now being laid.

Since there is scarcely a week passes without some city asking for the findings in this case, the decree rendered by Judge Pollock may not be out of place here. The following is the decree:

"This cause coming on to be heard, the parties litigant being represented, respectively, by their solicitors and counsel, and it appearing to the court that, of the mineral matter used in the pavements actually constructed in the Cities of Topeka and Emporia, Kansas, no particles of stone were used that would not pass a screen with openings one-half inch in diameter, and that less than ten per cent of the stone or coarse sand used, would be retained on a screen with openings one-fourth inch in diameter, and the remaining mineral matter used being finer than one-fourth inch; and it further appearing that pavements constructed by the use of mineral particles, as above described, do not infringe the claims of the complainant's patent No. 727,505, sued upon in this case; and it further appearing that the individual defendants named in this case have, since the commencement of this action, organized themselves into a corporation known as The Kaw Paving Company, which corporation has adopted specifications for the construction of bituminous pavements which required the use of particles of stone and bitumen in proportions substantially the same as those actually used in the pavements heretofore laid in Topeka and Emporia,

Kansas, by The Kaw Paving Company, none of which material was coarser than one-half inch, and not more than ten per cent of the same coarser than one-quarter inch.

And it further appearing that the pavements as actually constructed in the Cities of Topeka and Emporia, Kansas, do not infringe the claims of the complainant's patent No. 727, 505 sued upon in this case, and that any pavements hereafter constructed in substantial compliance with the following formula, to wit:

Bitumen	From 7 to 11%
Mineral Aggregate Passing 200 Mesh Screen "	5 to 11%
" 40 " "	" 18 to 30%
" 10 " "	" 25 to 55%
" 4 " "	" 8 to 22%
" 2 " "	" Less than 10%

Sieves to be used in the order named, would not infringe the claims of said patent.

It is, therefore, ordered, adjudged and decreed by the court, the parties complainant and defendant being represented by their respective counsel and consenting thereto, that the defendants herein, The Kaw Paving Company, their officers, clerks, servants, agents and workmen, be perpetually enjoined from directly or indirectly making, constructing, laying or causing to be constructed or laid any pavement as described and claimed in said Letters Patent No. 727, 505.

It is further ordered that, the matters in controversy between the parties litigant having been settled in accordance with the above findings, the bill heretofore filed in this cause be dismissed, without cost as against either party.

Dated May 26, 1910.

John C. Pollock, Judge.

O.K. J.M.Head

Eugene S. Quinton, Solicitors for Complainant.

O.K. Ferry, Doran & Magaw and

W. C. Ralston, Solicitors for Defts.

Endorsed: No. 8802 U.S.Circuit Court for District of Kansas. Warren Bros.Co., Plff. vs. The City of Topeka, et al., Defts. Decree. Filed May 26, 1910. Geo. F. Sharitt, Clerk."

This type of pavement consists of a foundation of either macadam, or concrete, and a wearing surface of asphaltic concrete.

The base, like the base for any other permanent pavement, should be built to meet the different requirements to which the conditions of traffic will subject it. As in other types of pavements, permanently successful construction can be secured only by the use of a substantial concrete base, and the concrete in this base should be so proportioned, as to mix and thickness, as to give it the proper strength to resist the stresses due to traffic and the expansive stress in the concrete itself, due to high temperatures. The failure of many asphaltic streets, attributed to an imperfect surface mixture, is due entirely to imperfections in

the base.

The wearing surface of an asphaltic concrete pavement should be a layer of such uniform thickness as the nature of the traffic requires. Practical experience has demonstrated that a two inch layer gives the most satisfactory results. A thinner layer has more tendency to crack and a thicker layer has a tendency toward waviness.

The asphalt industry has been developed to such a degree that, besides the old natural, or "God-made" asphalts, which have been on the market for years, there are now a number of manufactured asphalts which are giving excellent results as a cementitious binder.

In order to secure free competition in bidding, the specifications for asphalt should set forth certain chemical and physical properties which an asphaltic cement, to make a good paving material, should possess and retain. These requirements should be general enough to admit all of the better asphalts, or combinations of asphalts, from which it is possible to secure a good pavement.

Among the common qualities which are ordinarily specified and the relation which they bear to the durability of the pavement, are the following:

Impurities: Asphaltic cement should contain no

water or decomposition substances or other impurities. Water, if present in appreciable quantities, will cause trouble in the kettle, as a very small quantity will cause the asphalt to form in the kettle. Decomposition substances will cause disintegration of the asphalt while the amount of impurities indicates the degree of care which has been exercised in refining the asphalt.

Solubility: At least 95% of the asphalt should be soluble in carbon disulphide as the amount of bitumen which the asphaltic cement contains is determined by its solubility in carbon disulphide, and the cementing value of the asphaltic cement depends upon the bitumen present. Such impurities as free carbon, mineral matter, dirt and coked material, are not soluble in carbon disulphide.

The solubility of the bitumen in carbon tetrachloride enables us to determine whether carbenes are present, since carbenes are soluble in carbon disulphide and insoluble in carbon tetrachloride. Overheating while refining is what usually produces carbenes and an overheated asphalt is likely to be low in penetration, short on ductility, and it is quite probably that a wearing surface in which overheated asphalt is used, or one in which the solubility in carbon disulphide exceeds the solubility in carbon tetrachloride by two per cent or more, will crack.

Heat loss is a test that is used to determine the constancy of volume and the permanency of the consist-

ency of the asphaltic cement. During this test, the light oils and decomposable asphaltic materials are driven off. Asphaltic cement which shows a loss of weight of more than five per cent, or a change in consistency in which the original penetration is reduced as much as 40% to 50% should not be used, as the surface mixture will harden and crack.

The consistency of asphaltic cement is most readily determined by means of a penetrometer. The consistency to be desired depends upon the climate, the ductility of the asphalt, the proportioning of the mineral aggregate, and upon the traffic. Temperature changes should not too readily affect the consistency of the asphaltic cement. A degree change in temperature should not cause a variation of to exceed five degrees in penetration. In this climate, best results are to be obtained with a penetration of from fifty-five to sixty degrees at seventy-seven degrees F., with a ductility of from twenty-five to forty.

The cementing or holding power of the asphaltic cement is measured by its ductility and tenacity. To make a good cementing material, the asphalt should adhere tenaciously to the mineral aggregate and retain ductility at the lowest temperatures to which the street may be subjected.

After the chemical and physical properties of an asphaltic cement has once been determined for any particular work, the penetration and the ductility tests are, by far, the most important ones to be observed.

There are many grades of asphalt which, if used alone as an asphaltic cement, would make an unsatisfactory paving material, while the proper mixing of some of these unsatisfactory grades of asphalts, possessing different properties, results in a first class paving cement.

Some of the best asphaltic streets which are being laid today have as their cementing material, a combination of asphalts procured from widely different sections of the country. These asphalts properly proportioned produce a cement which meets all of the requirements of a high grade asphaltic cement.

This blending of certain asphalts produces some surprising results, as the mixture of 60% of certain grades of California asphalts, having a penetration of from 30 to 40, with 40% of Southern Kansas or Texas asphalts, having a penetration of from 40 to 50, results in an asphaltic cement having a penetration of from 60 to 70. Neither of the asphalts entering into the above composition would, alone, be suitable for paving purposes. This California asphalt, although quite high in ductility, is too susceptible to temperature changes, and low temperatures would develop many cracks, while

high temperatures would cause the street to mark badly and roll into ruts and waves. The Southern Kansas asphalt, on the other hand, is not readily affected by temperature changes but it is quite short on ductility and is lacking in tenacity, and a surface laid from this asphalt would ravel and disintegrate under traffic. A combination of the two, however, in the above proportions, results in an excellent asphaltic cement of which the following, from one of our many samples, is about an average of the physical properties:

60% Cal. penetration	32
40% S. Kansas penetration	43
Penetration of mix at 77 F.	63
Ductility of mix at 77 F.	35
Heat loss, 5 hrs. at 325 F.,	Not appreciable.
Per cent heat loss, 5 hrs. at 325 F.,	None
Penetration after heating	49
Hardening	22.2%
Penetration at 32 F..	33
Ductility after heating	25
Percentage loss in ductility	25.7%

By varying the proportions of the above asphalts, the physical properties can be made to extend over a wide range, and an asphaltic cement suitable for almost any condition can be produced.

Asphaltic concrete is composed of asphaltic cement and mineral aggregate. The cement, properly proportioned, serves to bind the mineral aggregate into a malleable, resilient and impervious mass. The proper proportions of cement to use depends upon the percentage of voids,

the amount of filler, the nature of the traffic and the consistency and tenacity of the asphaltic cement.

The proper proportion of the filler to use depends upon the voids in the mineral aggregate, and the amount and nature of the asphalt. The filler, which may be either fine stone dust or cement, holds the asphaltic cement, and by filling the voids in the coarser mineral, makes the mixture dense, stable and capable of resisting abrasion, displacement, and disintegration.

The sand and the broken stone, properly graded, reduces the voids, permits of the use of less asphalt, insures stability, and decreases the tendency towards displacement and rolling.

The asphaltic cement in asphaltic concrete, should be slightly in excess of the voids in the mineral aggregate, which should be reduced to a minimum by a careful grading of the material.

To secure a good pavement, all of the material which goes into the mixture should be carefully inspected and tested. The plant should be one of modern construction, especially designed to heat and mix asphaltic concrete, and the plant and its operation should be under careful supervision. The inspector should be provided with thermometers, sieves, scales, sample boxes, etc., and he should be alive to the fact that, unless

the hot mixture leaves the plant properly heated, graded and mixed, the construction will, necessarily, be faulty. The spreading of the surface mixture should be skillfully done by expert men, as it is impossible to secure a regular, smooth surface if the spreading has not been properly done.

Thorough compression has much to do with the life of an asphaltic street. The compression of the roller and the experience of the operator plays an important part in bringing to perfection an asphaltic surface which has been carefully mixed and skillfully spread.

The following is the grading of material which has given very satisfactory results on our ordinary traffic streets. The sample is one of the daily samples taken from the street as the surface is being spread and was reduced in the laboratory:

		Topeka Spec's.
A. C.	8.4%	8.4% 7% to 11%
200 Mesh	7.5%	7.5% 5% to 11%
100 Mesh	7.5%	
80 Mesh	4.6%	
50 Mesh	9.6%	
40 Mesh	10.6%	32.3% 18% to 36%
30 Mesh	7.4%	
20 Mesh	9.4%	
10 Mesh	12.4%	29.2% 25% to 55%
4 Mesh	18.5%	18.5% 8% to 22%
2 Mesh	4.1%	4.1% 0% to 10%.

Although asphaltic concrete, as now laid, has become quite popular with both the general public and the taxpayer, judicious care should be exercised as to where, when and how it is laid. There are many asphaltic con-

crete streets throughout the state which have shown defects due to various causes.

One of the most difficult defects to overcome is cracking of the wearing surface. This may be caused by too light or defective base, an insufficient amount of asphaltic cement, asphalt cement with too low a penetration, too low in ductility, or too susceptible to temperature changes. Cracks may also be caused by careless manipulation in mixing and in spreading.

Marking or picking up in hot weather is another defect due to the use of too soft asphaltic cement, too much asphaltic cement, asphaltic cement too readily affected by temperature changes, or by mineral aggregate being not properly graded.

Ruts or waves are caused by either the same defects as those which cause marking, or by a defective base, or too great a thickness of the wearing surface.

The formation of holes is caused by poor asphaltic cement, an insufficient amount of asphaltic cement, spongy asphaltic cement, a dirty and improperly graded mineral aggregate, and by a defective base.

These defects can be eliminated by proper inspection and supervision. By a scientific selection of material and careful grading, all of the different traffic conditions may be met, and equally satisfactory results obtained in light traffic resident sections and in heav-

ily congested business districts.

The following specifications are our standard, and they are the most widely distributed and commonly used bituminous specifications in use today. They have been developed by a careful analysis of conditions and results obtained in paving work on all kinds of streets and roads, under all kinds of traffic, extending over a period of eight years. We vary them within the limits specified so as to be able to meet all of the varied conditions which are to be encountered in paving work.

INSTRUCTIONS TO BIDDERS.

1. Proposals under different names will not be received from one firm or association.
2. The Mayor and Board of Commissioners of the City of Topeka reserve the right to reject any or all bids, or parts of bids, the rejection of which may be deemed advantageous to the city.
3. Each bidder will be required to deposit with the city clerk, to the credit of the City of Topeka, a certified check of deposit in the sum of dollars as a guarantee that he will enter into the contract, if awarded to him, according to the terms of his bid, within ten days after the certification of the award.
4. Each bidder is required to state in his proposal his name, place of residence and exact postoffice address,

and also the names and addresses of all persons, or parties, interested with him therein. Any one signing a proposal as agent, for another, or otherwise, must file with the proposal, acceptable evidence of his authority so to do.

5. Alterations by erasures or interlineations should be explained or noted in the proposal, over the signature of the bidder.

6. All prices must be written as well as expressed in figures.

7. No proposal will be accepted from any person, or firm, who is in arrears to the City of Topeka upon debt or contract, who is in default as surety, or otherwise upon any obligation to the City, or who has failed in previous contracts to comply with the requirements of the specifications and to fulfill his contracts.

8. No extra compensation will be allowed for the laying of raised cross-walks, nor for wood-headers.

9. Samples of the paving brick, asphalt, and all other material shall be filed with the City Engineer before contract is awarded. Each sample shall be plainly labeled with the date and place from which it was brought. Such samples will not be returned, but under all circumstances will be retained by the City.

10. Proposals shall specify the rate per cubic yard for all grading, both park and roadway, on the street to

be improved, and the approaches thereto, from property line to property line, and for the necessary reparation of roadbed, which price shall include everything required under the specifications for the same, the rate per lineal foot for all new cement curb, new cement gutter, and combined curb and gutter furnished and set, the rate for resetting old curbing; the rate per cubic yard for extra concrete, if any is used; the price per cubic yard for broken stone or gravel; the rate per square yard for paving and for relaying old pavements which shall include all excavations and cleaning up, all the required material, foundations and labor to complete the same. Also the price per square foot for taking up and relaying all sidewalks, either cement or brick, which shall include all the necessary excavation and sand. The price per square foot for all new walks either brick or cement, and the price per superficial foot for cement steps all sizes. The price per foot for raising or lowering manholes and catch basins, the price per foot for new manholes, the price each for new catch basins complete, and the price per lineal foot for building storm sewers. The contractor will be required to bid on each and every item called for in the proposal.

11. Bidders are invited to be present at the opening of the proposals. All proposals shall be made and received with the express understanding that the bidder accepts the terms and conditions contained in these instruc-

tions, and the specifications, forms of contract, and the bonds referred to herein.

12. All bids will be canvassed upon the approximate quantities designated upon the respective plans on file in the office of the City Engineer, and the lowest bid will be determined upon the basis of the aggregate cost.

13. Bids must be made on every item for the class of paving bid on and the list of extras in the printed proposal bound herein, and no changes shall be made in the phraseology of the proposal, nor shall any additions be made to the items.

....., City Clerk.

Dated Topeka, Kansas,day of, 19....

PROPOSAL.

Topeka, Kansas,, 19....

To the Mayor and Board of Commissioners
of the City of Topeka:

The undersigned hereby propose to grade, curb and gutter, and pave the streets, avenues and alleys in the City of Topeka in the districts herein named, by furnishing all the material and labor for making the necessary excavations for the same, and constructing foundations and paving, curbing and guttering the roadway, including any and all work and materials that may be necessary to connect the work with the adjoining work in a proper and workmanlike manner, and accord-

ing to the plans prepared by and on file in the office of the City Engineer, and upon the terms and conditions of the Specifications and form of Contract and Bond herein, and the rules and regulations of the City, and under the direction and supervision and to the satisfaction of the City Engineer, and subject to his acceptance, and the approval thereof by the Mayor and Board of Commissioners of the City of Topeka, at the prices following the accompanying classification, which shall form the basis of the Proposal on all work herein referred to in connection with the Specifications and Stipulations contained herein.

The undersigned also proposes and agrees, that the City of Topeka may deduct and retain four (4) per cent of the entire contract price of construction of said public improvements, as stated in this proposal, from said contract price, to pay the cost and expense of engineering, superintending, inspecting, appraisement, printing, advertising, and all incidental expenses connected with or relating to the construction of said public improvements, which have or may be incurred by said City, and may pay such incidental expenses as aforesaid, and deduct the same from the estimate made by the City Engineer.

The undersigned further purposes to enter into a contract with the City of Topeka for the construction of

said public improvements, and to furnish approved surety company bonds for all the bonds mentioned in these specifications.

<u>QUANTITIES.</u>	<u>CLASSIFICATION.</u>	<u>WRITTEN PRICE.</u>	<u>FIGURES.</u>
.....sq.yds.	Asphaltic Concrete, 4" Concrete Base, 2" Surface, .....	.....
.....sq.yds.	Asphaltic Concrete, 5" Concrete Base, 2" Surface, .....	.....
<u>KIND OF WORK.</u>	<u>WRITTEN PRICE.</u>	<u>FIGURES.</u>	
...Sq.yds.Resurfacing Asph.			
Conc.,per cu.yd.,	.....	
...Sq.yds.Remov'g old mat.			
and clean up,per cu.yd.....			
...Cu.yds.Concrete,per cu.yd.	.....	
...Cu.yds.Grading, per cu.yd.	.....	
...lin.ft.7 in.Comb.curb & gut'r			
1-yr.guar.,ft.	.....	
...lin.ft.9 in.Comb.curb & gut'r			
1-yr.guar.,ft.	.....	
...lin.ft.Curb,1-yr.guar.,ft.	.....	
...lin.ft.Cement Gutter,lin.ft.	.....	
...lin.ft.Curb Reset, lin.ft.	.....	
...lin.ft.Manholes,new,lin.ft.	.....	
...Catch Basins,new,each	.....	
...lin.ft.8 in.Vit.Clay Sewer			
Pipe,per lin.ft.	.....	
...lin.ft.10 in.Vit.Clay Sewer			
Pipe,per lin.ft.	.....	
...lin.ft.12 in.Vit.Clay Sewer			
Pipe,per lin.ft.	.....	
...lin.ft.15 in.Vit.Clay Sewer			
Pipe,per lin.ft.	.....	
...lin.ft.18 in.Vit.Clay Sewer			
Pipe,per lin.ft.	.....	
...lin.ft.21 in.Vit.Clay Sewer			
Pipe,per lin.ft.	.....	
...sq.ft.New Cement Walk,sq.ft.	.....	
...sq.ft.New Brick Walk,sq.ft.	.....	
...sq.ft.Cem.Walk taken up &			
relaid,per sq.ft.	.....	
...sq.ft.Brick Walk taken up &			
relaid,per sq.ft.	.....	

KIND OF WORK.	WRITTEN PRICES.	FIGURES.
...sq.yds.Old Pavem't taken up & relaid,per sq.ft.	
...lin.ft.Manholes raised,per lin.ft.	
...lin.ft.Manholes lowered,per lin.ft.	
...lin.ft.Catch Basins raised, per lin.ft.	
...lin.ft.Catch Basins lowered, per lin.ft.	
...lin.ft.Inlets raised,lin.ft.	
...lin.ft.Inlets lowered,lin.ft.	
...ft.Cement Steps,all sizes, per superficial ft.	
...Cu.yds.Broken Stone or Grav- el,per cu.yd.	
...Cu.yds.Sand,per cu.yd.	
.....	
.....	

BIDDERS:

.....
.....

GENERAL STIPULATIONS.

1. The public improvements contemplated under these specifications shall be built of the dimensions and materials, with the grades and locations shown on the plans for said work, approved by the Mayor and Board of Commissioners....., 19... The contractor shall advise himself, as far as possible, of the location of all the improvements and the conditions under which the work is to be done.

2. All materials furnished shall be subject to the approval of the City Engineer, and the contractor shall furnish all facilities for inspecting them when required, which inspection shall take place before said materials,

or any part thereof, are in any manner used in the construction of said improvements by the contractor.

3. All material furnished, and work done, which, in the opinion of the Engineer is not in accordance with these specifications, or to his satisfaction, shall be immediately removed, and other material furnished and work done which shall conform thereto.

4. The work under this agreement is to be executed in a thorough and workmanlike manner, to the satisfaction of the Engineer; and to be commenced and carried on in such order of precedence, and at such time, and with such force as he may from time to time direct.

5. The Engineer shall have the power, at all times, of regulating the number of blocks which may be open, in advance of the completed portion of the pavement.

6. The contractor shall make provisions, at all cross streets and alleys, for the free passage of vehicles and foot passengers, either by bridge or otherwise, and shall not obstruct the gutters of any street, nor prevent, in any manner, the flow of water in the same; and shall use all proper and necessary means to permit the free passage of vehicles and foot passengers across said streets, special care being taken to inconvenience as little as possible the citizens residing along the line of the work. As soon as the curb on a street is in, all walk intersections connecting with

the curb shall be immediately built, all walk relay completed and all surplus material immediately removed.

7. The contractor shall properly protect the public from all open work and place sufficient red lights on or near the work, and keep them burning from twilight in the evening until sunrise, and shall employ a watchman as an additional security; and will be held responsible for any damages that any parties, or the City, may sustain in consequence of neglecting the necessary precautions in prosecuting the work.

8. Whenever the contractor is not present on any part of the work, where it may be necessary to give directions, orders will be given by the City Engineer or inspector, and obeyed by the foreman who may have immediate charge of the work.

9. No work will be considered as accepted which may be deficient in any of the requirements of these specifications, in consequence of the neglect of the Engineer, or inspector, to point out such defects during construction; and the contractor will be required to make good any imperfect work, whenever, discovered, before the final acceptance of the work.

10. All new work shall be carefully protected, and no wheeling or walking on it shall be allowed. Any work injured before the completion of the whole work, must be rebuilt by the contractor without pay.

11. The contractor shall preserve all stakes set to mark lines or levels in their proper position until authorized to remove them. Any contractor whose men shall carelessly or intentionally tear out, or knock down the stakes once set shall pay the cost of resetting them at the rate of \$1.00 per stake; said cost shall be deducted from any or all estimates due the contractor.

12. The estimates of the various contractors shall be made every thirty days, and ninety per cent of the work done shall be allowed the contractor, but no allowance will be made for material on the ground nor for paving base or unfinished paving.

13. A final estimate will be made, block by block, at such time as the contractor has fulfilled his entire contract to the satisfaction of the Engineer, and it has been accepted by the Mayor and Board of Commissioners, and 10% of the entire price of the final estimate will be withheld and shall not be due the contractor until thirty days after completion, and final acceptance by the Mayor and Board of Commissioners.

14. All contractors will be required to place their material and do their work in the manner, order and rotation directed by the City Engineer, and any refusal or failure to follow the instructions of the City Engineer will be sufficient cause for the forfeiture of such contract by the Mayor and Board of Commissioners.

15. Contractors will be held liable for damages to houses, fences, sidewalks, trees, parks or shrubbery, water, gas, sewer and heating pipes, which they may in any way injure or destroy by grading, teams hauling material, or otherwise, and such contractors must settle with the property owners for any such damage, and in case of failure to make such settlement within thirty days after the bill has been filed in the City Engineer's office, the City may settle for the same and deduct the amount thereof from the next estimate allowed such contractors on any street; and in case a claim of suit for damages is presented or brought after the final estimate is given, the contractor and sureties shall be held for such damages on the bond herein provided for.

16. The contractors must remove all spalls and bats from the parks and leave the same entirely free from rubbish, or debris, of any kind that has been deposited there during the construction of the work.

17. The contractors on any part of the work shall remove all the material and rubbish from the streets as the work progresses, and not leave tools, material, or work in such manner as to inconvenience residents or citizens more than is absolutely necessary for the completion of the work, and shall comply promptly with the requirements of the City Engineer in removing materials and tools, and in opening of new work, or the completion

and cleaning up of unfinished work; and it is further expressly understood and specified that the entire work and all portions of the same, shall be done in a thorough and workmanlike manner by competent persons, and to the entire satisfaction of the City Engineer, Mayor and Board of Commissioners.

18. The sub-grade shall be excavated to the exact form of the surface of the pavement as shown on plans. All irregularities in the sub-grade caused by the contractor's carelessness in going too deep, shall be filled up with rock, or such other material as may be ordered by the Engineer, to the required level, and solidly rolled. For such work no price will be paid either for the removal of the dirt below sub-grade or the rock required to fill the same to said sub-grade.

19. It shall be the duty of the contractors to acquaint themselves with the conditions of the sub-grade before delivering sand or commencing work, and in no case will the City make the contractor an extra allowance for labor or material on account of the sub-grade being too low or too high.

20. The contractor will be required to repave or remacadamize any roadway; to replace, rebuild and reset any sidewalks, fences, or curb, gutter, bridge or flagstone; replacing with new material any which may have been injured or destroyed by the negligence of the con-

tractor, or his men, in driving over them or in any way whatsoever. In delivering dirt the contractor will be held liable for all damages to sidewalks, and shall repair same when ordered by the Engineer.

21. Brick manholes and catch basins shall be built where shown on plans as hereinafter provided.

22. The prices for the pipe, or storm sewers, are to include the cost of excavating and refilling trenches, even when material has to be borrowed, the breaking into manholes or catch basins, and the removal of surplus material. Nothing will be allowed for back filling or for removing surplus material.

23. In case a curbing or paving contractor should have neglected to bid on resetting curb or relaying pavement or any other work, he shall do such work under the direction of the City Engineer and at the City Engineer's estimate.

24. Contractors will be required to furnish to the city a good and sufficient surety company's bonds, to be approved by the Mayor and Board of Commissioners, in an amount not less than the contract price, conditioned for the faithful performance of their contract, and such bonds shall also indemnify the City against any loss or damage which the City may sustain or suffer on account of injury to person or property rights, caused or permitted by said contractors or their employees.

25. Contractors will be required to furnish a good and sufficient surety company bond to the State of Kansas, in an amount equal to the total amount of the contract, conditioned that such contractors shall pay all indebtedness incurred for labor or material furnished in the making of said public improvements. Such bonds shall be filed in the office of the Clerk of the District Court of Shawnee County, Kansas.

26. The contractor on asphaltic concrete pavement will be required to furnish to the City a good and sufficient surety bond, to be approved by the Mayor and Board of Commissioners, in an amount not less than \$600 per block. Said bond to protect the City from all claims, or damages, or royalties, for any patent, invention, or copyrighted products, arrangements or appliances, which may be required in the construction of said pavement under these specifications and contracts.

27. The paving contractor on asphaltic concrete will be required to give a good and sufficient maintenance bond to the City of Topeka to the amount of five hundred dollars (\$500) per block, conditioned that he will make all repairs of said pavement free of charge for five years after the date of its acceptance, which may become necessary within that time by reason of any imperfection in said work or material used, or poor or defective workmanship in putting down said material,

and by reason of any rotting, crumbling or disintegration of said paving material.

28. Payment will be made in cash or street improvement bonds at the option of the Mayor and Board of Commissioners.

29. In performing the work done under any contract, of which these specifications may be a part, the contractor will be governed by the laws of the State of Kansas, and the ordinances of the City of Topeka, fixing eight hours as a day's work, and no contractor shall work his employees more than eight hours in any twenty-four hours.

30. Necessary sanitary conveniences for the use of the laborers on the work, properly secluded from observation, shall be erected and maintained by the contractor, in such manner and at such points as shall be approved. The contents of the same shall be removed with sufficient frequency to prevent nuisances and disposed of to the satisfaction of the Sanitary Department of the City of Topeka.

31. Time being the essence of any contract awarded, of which this contract may be a part, the contractor will forfeit to the City of Topeka the sum of \$10.00 per day as liquidated damages for each and every day after the expiration of the time limit fixed in the contract until said work is fully completed. And he will also be held liable for the wages of the inspectors on

the work after the said time limit fixed in the contract has expired.

S P E C I F I C A T I O N S

GRADING.

1. All grading will be classified and paid for as earth, and no extra will be allowed in case the contractor encounters rock or other material.

2. The earth roadbed on which the pavement is to rest shall be graded, as directed by the City Engineer, to the required depths below the intended surface of the street, in accordance with stakes set by him. The surface of such roadbed shall be parallel to, and conform to the cross-section of the pavement when finished. The rough grading shall first be done by plowing and scraping, or in any manner the contractor may choose, but the earth shall be left sufficiently above the proposed sub-grade to allow for rolling. After this is done, the contractor shall construct the curb and gutter and then properly roll the sub-grade with as little delay as practicable, after the curb is set with a roller weighing not less than eight (8) tons. The contractor shall then place templates from gutter to gutter, as directed by the Engineer, and then proceed to dress down to a true surface, or else to fill up, as may be required by the Engineer. Then it shall be

rolled again and the contractor shall again place templates, and the surface shall be again dressed down, or again filled up, when it shall again be rolled. This shall be repeated until the surface of the roadbed shall be true to surface and the ground thoroughly compacted to the proper sub-grade. The rolling shall be done under the direction of the City Engineer and to his satisfaction. Such portions of the roadbed as cannot be reached by the roller shall be made solid by ramming, and all soft, spongy places, not affording a firm foundation, shall be dug out by the contractor, and all trenches shall be refilled with good earth or rock, as the Engineer may direct. In all places where filling is required to bring the road to the required height, it shall be done in layers not to exceed eight (8) inches in depth, and rolled as often as the City Engineer may require.

3. All approaches connecting streets to be paved with other streets, or alleys, intersecting, shall also be cut, or filled, as the case may be, so that the same shall conform to states set by the Engineer.

4. All surplus material taken from the street, except the old paving and sand adjoining private property on West 5th Street from Kansas Avenue to Harrison, shall be hauled by the contractor to any place the City Engineer may direct, and when hauled more than 1,500 feet, the contractor shall be allowed one cent per cubic yard

for each 100 feet in excess of 1,500 feet. The contractor will be required to do all the dumping and spreading of the dirt at the place of destination, and to finish dump to grade stakes if required by the City Engineer.

5. The ground must in no case be plowed below sub-grade, and in case the contractor does plow below said sub-grade, he will be required to fill same with rock, or concrete, as the Engineer may direct, without extra cost to the City.

6. Grading will be paid for by the cubic yard, at the price named in the contract; it will be estimated in excavation only. The price per cubic yard shall include all the grading and trimming of parks and sidewalks, and the trimming, shaping, refilling, picking down, and surfacing to bring the surface of completed roadbed, after it has been rolled or re-rolled, to the exact surface required by the City Engineer, and to include all and every expense for carefully stretching lines and placing templates as directed by the Engineer, and all other expenses, direct or indirect, connected with the proper performance of the work, and maintaining the same in perfect condition, until the same is received by the Engineer.

7. When the Engineer shall order an excavation made below sub-grade for the purpose of removing mud, clay or

other soft material, work so ordered shall be done by the contractor, and the same filled up with dry earth, obtained where the Engineer may direct, or with rock or concrete, if the Engineer so directs, and all tamped thoroughly, and made firm and secure. The excavation and filling shall be paid for at the price per cubic yard stated in the contract for material used.

8. No excavated material will be at the contractor's disposal, except old pavement and sand adjoining private property on West 5th Street, from Kansas Avenue to Harrison Street, but must be delivered where ordered by the Engineer. The old pavement and sand adjoining private property on West 5th Street shall become the property of the contractor as part consideration for pavement.

9. The price bid for grading, shall include all grading and finishing to be done on the street and parks, from property line to property line.

10. The contractor shall do all necessary grading, as required by the City Engineer, on the sidewalks, parks, crossings or in the street intersections contiguous to the block under contract, at the price per cubic yard named in the contract for street grading, before receiving final estimate.

11. It is especially understood that the contractor shall maintain the surface of the roadbed in perfect condition until the same is received by the City Engineer.

12. The contractor will be required to remove, and deliver to places designated by the Engineer, all trees, stumps, shrubbery, fences, stone, sidewalks, sand, and so forth, necessary for the improving of the roadway, or parks, as instructed by the City Engineer, without extra compensation from the City.

13. The contractor must exercise care in hauling earth or other material, so that same shall not be scattered along the street, and where the same is hauled over paved streets the contractor shall be required to remove any earth, or other material, scattered on the pavement; and if he fails to do so within a reasonable time the debris shall be removed by the street commissioner and the cost of removing the same deducted from the final estimates.

ARTIFICIAL STONE CURB AND GUTTER.

1. Artificial stone curbing, and stone curb and gutter combined, will be known as cement curbing, and will be of the materials and dimensions stated below. It shall be constructed along, and ahead of the finished sub-grade for the pavement foundation.

2. The finished grading for preparing the base or sub-grade, and compacting it to render it suitable for curb and gutter construction, shall be done by the contractor and be considered as part of the work under contract, and no extra charges will be allowed for same.

No back filling with earth, where the sub-grade of the curbing has been excavated too low, through carelessness of the contractor will be permitted. All such places shall be filled with concrete by the contractor, and no extra pay will be allowed for the same. The contractor shall assume all responsibility for any defective work in the sub-grade where filling is required, and all damages to curb caused by rolling the sub-grade for the foundation of the pavement.

3. The material embraced in the construction of artificial stone curbs, and combined curb and gutters, shall be a concrete, consisting of Portland cement, Joplin flint, or hard limestone, together with a certain amount of clean, coarse sand. Samples of cement, crushed stone, Joplin flint, sand and other material shall be submitted to the City Engineer for approval.

CEMENT.

4. All cement shall be delivered or stored at some suitable point for inspection, and the City Engineer notified and given access to the same at least ten days before it is required for use, and any work in which rejected cement was used will be rejected altogether.

5. The cement shall be packed in strong bags having printed on the outside the brand of the cement and the name of the manufacturer. No broken bags will be accepted.

6. Four (4) bags shall constitute a barrel and the average net weight of the cement contained in one bag shall be not less than ninety-four pounds, or three hundred and seventy-six (376) pounds net per barrel. The weight of the separate bags shall be uniform. Cement failing to meet the seven (7) days requirements may be held to await the twenty-eight (28) day tests before rejection.

7. Samples shall be taken at random from the sound packages, and the cement from each package shall be tested separately. The acceptance or rejection shall be based on the following requirement: The term "Portland cement" by the terms of this contract is applied to the finely pulverized product resulting from the calcination to incipient fusion on an intimate mixture of properly proportioned argillaceous and calcareous materials, and to which no addition of greater than three (3%) per cent has been made subsequent to calcination.

8. The specific gravity of the cement, thoroughly dried at 100 degrees Centigrade shall not be less than 3.10.

9. It shall leave by weight a residue of not more than eight (8%) per cent on a No. 100, and not more than twenty-five (25%) per cent on a No. 200 sieve.

10. It shall develop initial set in not less than thirty minutes, but must develop hard set in not less

than one hour, nor more than ten hours.

11. The minimum requirements for tensile strength for briquettes one inch square in section shall be within the following limits and shall show no retrogression in strength within the periods specified:

Age.	Neat Cement.	Strength.
24 hours.....		175 lbs.
7 days(1 day in moist air, 6 days in water)		500 lbs.
28 days(1 day in moist air, 27 days in water)		600 lbs.

One Part Cement, Three Parts Sand.

7 days(1 day in moist air, 6 days in water)	200 lbs.
28 days(1 day in moist air, 27 days in water)	220 lbs.

12. Pats of neat cement about three inches in diameter, one-half inch thick at the center and tapering to a thin edge, shall be kept in moist air for a period of 24 hours.

(a) A pat is then kept in air at normal temperature and observed at intervals for at least 28 days.

(b) Another pat is kept in water maintained at as near 70 degrees F. as practicable, and observed at intervals for at least twenty-eight days.

(c) A third pat is exposed in any convenient way in an atmosphere of steam above boiling water, in a loosely closed vessel for five hours.

These pats, to satisfactorily pass the requirements, shall remain firm and hard and shall show no signs of distortion, checking cracking or disintegrating.

13. Cement shall not contain more than 1.75 per cent of anhydrous sulphuric acid nor more than 4% of magnesia.

14. The curbs, and the combined curb and gutter, shall be constructed by skilled workmen, and shall consist of two parts, the body and the wearing surface.

15. The body, which shall comprise all except the exposed $3/4$ inch, or wearing course of straight curb, and combined curb and gutter, shall be made of concrete composed of Portland cement, crushed stone or Joplin flint, and sand, in the following proportions:

16. One part of Portland cement; two parts of clean sharp Kaw river sand; and four parts of Joplin flint or granite; or,

Four parts of clean hard native lime stone entirely free from dust, dirt or shale. The proportions of the sand and stone may be varied at the option of the Engineer, but no change will be allowed which will affect the proportions of the cement to the total amount of the aggregate as specified. The largest fragment of Joplin flint, crushed granite, or native lime stone shall not exceed three-quarters ($3/4$) of an inch in its greatest dimensions, and shall be free from dust, dirt, and such fine particles as will pass through a No. 16 sieve, having 256 meshes to the square inch.

17. The cement, sand and stone shall be thoroughly

mixed dry, and then sufficient water added so that when the mixture is placed in the form and thoroughly rammed the water will flush to the surface.

18. The facing and top of the curb and of the gutter will be three-quarters ($3/4$) inch in thickness, and will be made of one part of Portland cement, and one and one-half parts clean, sharp and coarse Kaw river sand. This facing must be spread on the concrete base and floated while the latter is still soft and adhesive, after which the surface must be smoothed and compacted by thoroughly and skillfully troweling at least twice before the cement is too hard for such finishing.

19. The work must be kept moist and protected from the direct rays of the sun until perfectly set; no concrete curb, or curb and gutter, shall be built when the temperature during the day, or night, falls below thirty-five (35) degrees or goes above ninety-eight (98) degrees Fahrenheit in the shade.

20. The parts of cement, sand and stone used in construction must be proportioned by exact measurement, satisfactory to the City Engineer, or inspector, and any material mixed or put in place in the absence of such inspection must be taken out and replaced, when so ordered by the City Engineer, or his representative. No material that has begun to set will be allowed in the work after once disturbed.

21. The dimensions of artificial stones, or cement curbing, shall be as follows: The straight cement curb shall be six (6) inches in finished thickness and eighteen (18) inches in finished depth, with upper face corners rounded to a radius of two (2) inches.

22. After the necessary excavation has been made for the proposed curbing the bottom must be rammed to a true surface with hand rammers weighing not less than fifteen (15) pounds each. Upon this bed, after it is well moistened, shall be constructed a curb which shall form a solid mass divided every six (6) feet or as near thereto as may be, of its length in separate sections separated by iron templates, three-sixteenths ($3/16$) of an inch thick, to be withdrawn after the concrete has set. The joints shall be smooth, straight, as small as practicable, and shall be plumb throughout their depth, and at right angles to the line of work. Additional expansion joints shall be provided at such places and of such dimensions as shall be directed by the Engineer. These expansion joints shall be filled with an elastite saturated felt filler, when so ordered by the Engineer.

23. The facing, of $3/4$ inch in thickness, constructed on the street face of plain curbs, shall extend to a depth of eight (8) inches below the top.

24. The combined curb and gutter will be of the same material and governed by the same specifications as the

cement curb, except in form and dimensions as shown in the accompanying plans of combined curb and gutter, which plans are on file in the office of the City Engineer.

25. When gutter alone is to be constructed, it shall be built of the same material called for in the specifications for cement curb, and of the depth and width as shown on plans for same on file in the Engineer's office.

26. In the combined curb and gutter, the structure shall be made in one mass and must be constructed at the same time, and if any crack or cleavage is shown between the perpendicular and horizontal sections it will be condemned and must be replaced.

27. The curb shall be protected from sun and wind by canvas, or plank covering when required by the Engineer, and sprinkled with water at least twenty-four hours after completion.

28. Any stone, the facing of which is imperfect, from any cause whatsoever, shall be taken out and replaced by a new stone. No re-surfacing will be permitted under any circumstances after the body of the curb has set.

29. The curb and gutter must have been in place and finished at least forty-eight hours before the finished grade of the street is made, or the pavement shall be laid against the same, and the gutter must be kept cover-

ed by one inch of damp sand during the time required to finish grade and the construction of the pavement adjoining. No curb, or curb and gutter combined, will be accepted as finished or completed until the entire block of pavement has been accepted by the Mayor and Board of Commissioners.

30. Curbs to a radius of five feet, except as otherwise directed or shown on plans, shall be set at the corners of the streets and shall not exceed three sections. The entrance to alleys and private driveways shall have a radius of four feet unless otherwise directed by the City Engineer, and shall not exceed two sections. Corners, except at private driveways, will be measured by lineal foot along the face of the curb as set, and no extra allowance will be made for any special curves or shapes, or raised, or depressed gutters.

31. The contractor must protect the work during the construction of curbing and guttering until the surface is ready for use, against the elements, or damage from any cause, and in the construction of artificial stone combined curb and gutter, the contractor agrees to allow a steam roller weighing ten tons, or more, to travel within six inches of the edge of the gutter ten days after the same has been built, and to permit said roller to compact pavement next to said gutter within twenty

days after its completion and to replace any section that may be injured in said rolling.

32. The filling back of curbs must be tamped and otherwise treated, as the City Engineer may direct.

33. The curbing contractor on artificial stone curbing, and combined curb and gutter, will be required to give a good and sufficient maintenance bond to the City of Topeka, to the amount of \$300.00 per block, conditioned that he shall make all repairs of said artificial stone curb, or combined curb and gutter, free of charge for a period of one year after the date of its completion and final acceptance by the Mayor and Board of Commissioners, which may become necessary within that time by reason of any imperfection in said work, or material used, or poor or defective workmanship in putting down such material.

ROLLING.

1. All rolling shall be done under the supervision of the City Engineer, and in strict conformity with his instruction, and at such times and places as he may direct, and so as to cause as little delay as practicable. The City reserves the right to postpone or omit the rolling at any time or place when in the judgment of the City Engineer, rolling is impracticable or unsafe, on account of wet weather or other cause; or to order a preliminary coating of sand, or a temporary planking of the earth surface during the first rolling.

2. All grading must be rolled at least six (6) times over the entire surface of the street or alley to be paved, and as many times more as in the judgment of the City Engineer may be necessary to bring surface to true grade. The contractor will be required to furnish such material as the Engineer may direct to fill up any holes or ditches or remove and refill any soft or muddy places that may be found in rolling, in which case the rolling will be repeated until all such places are thoroughly compact and firm.

3. All rolling must be done by a self-propelling roller weighing not less than eight (8) tons, and of a make satisfactory to the City Engineer, Mayor and Board of Commissioners; such roller must be self-propelling at all times, and be able to back into or run out of corners, or pockets, not less than one foot larger than its wheel base, and to roll close up to curbing not more than eight (8) inches high without marring or injuring the same. The front wheels of the roller used must be placed together so as to make but one continuous drum.

4. The contractor shall notify the City Engineer at what time he intends rolling a block so the City may have a representative on the work to see that it is rolled properly.

5. The contractor shall be responsible, both per-

sonally and on his bond, for any damage done to property or person by reason of the use of the steam roller on the public streets, and he must exercise great care in moving the roller from one location to another, so as not to frighten horses or damage pavements, sidewalks, crossings, etc.

CONCRETE BASE.

1. When concrete base is used it shall consist of Portland cement concrete proportioned as follows: One part cement, two and one-half parts sand and five parts broken stone or washed gravel. The proportions of sand and stone may be varied at the option of the Engineer, but no change will be allowed which will affect the proportions of cement to the total aggregate as specified.

2. The concrete must be well and evenly mixed by a mechanical mixer of approved type and compacted to the required depth. Its surface must be smoothed evenly over the entire area with floats and made to conform to the finished surface by means of templates. No spalling off or scaling will be permitted.

3. Each batch of concrete shall be thoroughly mixed the mixing being continued until each piece of stone, or gravel, is completely covered with mortar. It shall then be spread and at once thoroughly compacted by ramming, until free mortar appears on the surface. The whole operation of laying and mixing shall be done as

expeditiously as possible, with the use of a sufficient number of skilled men. The upper surface is to be exactly parallel with the surface of the pavement to be laid, and shall be protected from the action of the sun and wind until set.

4. The cement shall be a first class brand of Portland cement and of the same quality as specified for curb and gutter.

5. The sand shall be hard-grained, coarse, moderately sharp and free from loam, quicksand or any other foreign substance.

6. The broken stone shall be a good quality of crusher-run limestone, or gravel, none of which shall exceed two inches in its largest dimension with all particles which will pass a No. 16 screen, having 256 meshes per square inches screened out; such stone, or gravel, to be clean and free from dirt of other foreign material.

7. Any stone or other material condemned as being at variance with these specifications, shall be at once removed from the work.

8. Concrete serving as a base for brick pavement, shall be covered with the required depths of clean sand, free from earth or dust. This, if required by the City Engineer, shall be sprinkled to a sufficient extent daily to prevent injurious action of the sun or the wind during

the week following such completion, and all travel shall be excluded from such concrete for at least one week after it has been laid.

9. No concrete shall be laid when the temperature, at any time during the day or night, goes below 32 degrees F., unless by and in direct accordance with the directions of the Engineer. No concrete shall be laid on frozen sub-grade.

10. Whenever concrete is to be laid on old concrete beds for repaving purposes, the old surface shall be thoroughly cleaned and shall be sprinkled before the additional base shall be laid.

11. Gutters on streets to be repaved, when required to be laid with other material, shall be of such width, material and base, as shall be specified or shown on the plans. The outer edge of such gutters will be paid for at the rate of the contract price per lineal foot for gutters, under the classification to which they belong.

12. A three-fourths inch bituminous expansion joint or elastite, saturated felt joints of such thickness as may be directed by the City Engineer, shall be provided across the pavement every 50 feet through its entire length and along the gutter on the sides if required by the City Engineer.

ASPHALTIC CONCRETE PAVEMENT.

1. Asphaltic Concrete. On the foundation prepared

as aforesaid shall be laid the asphaltic concrete, or pavement proper, which shall be prepared of the material mixed and laid in the manner hereinafter described.

2. The asphaltic cement to be used in this pavement shall be the best quality of asphaltic cement, composed of asphalt refined to a melting point of from 140 to 220 degrees Fahrenheit, and shall show by analysis at least ninety-five per cent of bitumen soluble in bisulphide of carbon. It shall be specially refined and brought to a uniform standard in purity and specific gravity, and shall comply with the standard specifications adopted by the "Organization of City Officials for Standardizing Paving Specifications". The asphaltic cement shall be melted in a suitable apparatus and care taken to prevent it being heated in excess of 375 degrees Fahrenheit. Any commercial asphalt may be used, which possesses the properties herein described, and which has demonstrated that it retains these properties by having been in successful use in an asphaltic pavement for a period of at least three years, but no inferior grade of asphalt shall be used.

3. A statement giving the name and source of supply and a complete chemical and physical analysis, by a chemist of recognized standing, of any asphaltic cement proposed to be used, shall be filed with the City Engineer, and approved by him before the contract is awarded. At

least fifteen days before any of the asphaltic cement is used, a complete physical and chemical analysis, by a chemist of recognized standing, of the asphaltic cement delivered for use in the work shall be filed with the City Engineer.

4. Where fluxing or softening materials are used with any asphalt, the relative proportions of each shall be specifically set out, and samples of both the asphalt and the fluxing or softening materials shall be required before award of contract is made.

5. When combinations of different asphalts are proposed to be used, there must be furnished in writing before the contract is awarded the names of the respective kinds and the proportions of each kind to be used in such combination; and the brands of oils or other softening agencies, with the respective proportions of each.

6. Refined asphalts and flux used in preparing the cement shall be melted together in a kettle at a temperature ranging from 250 degrees to not over 375 degrees F., and shall be thoroughly agitated when hot, by air, steam or mechanical appliances, until the resulting cement has become thoroughly mixed into a homogenous mass. The agitation must be continued during the whole period of preparing the mixture. The cement shall always be of uniform consistency, and if any portion should settle in the kettle between intervals of using the same, it

must be thoroughly agitated before being drawn for use.

7. The asphalt cement shall have a penetration of from 40 to 75, at 77 degrees F. which shall be varied within these limits to adapt it to the particular asphalts used in the paving mixture and to traffic and other conditions.

8. When 20 grams of the asphaltic cement of the penetration to be used in the paving mixture shall be heated for five (5) hours at a temperature of 325 degrees in an oven, as officially specified, there must not volatilized more than 5% of the bitumen present, nor shall the penetration at 77 degrees F., after such heating, be less than one-half of the original penetration.

9. A briquette of asphaltic cement when at a penetration of 50 having a cross section of one square centimeter, shall elongate to the extent of not less than 20 centimeters nor more than 60 centimeters at 77 degrees F. If the asphaltic cement as used in the paving varies from 50 penetration, an increase of at least two (2) centimeters in ductility will be required for each five points in penetration above 50 and a corresponding allowance will be made below 50 penetration.

Carbon. The bitumen of the asphaltic cement shall yield, upon ignition, not more than 15% of fixed carbon for an asphaltic cement of a penetration between 75 and

85 and not more than 16½% for an asphaltic cement with a penetration of from 40 to 75.

Stone. The stone used in producing the asphaltic concrete mixture shall be hard, durable, granite, traprock, limestone or gravel, free from any foreign substance, crushed in such a manner to pass a one-half inch screen and produce enough fine material to fill all voids and produce a solid as near as possible. Where the said stone or gravel does not give enough fine material to fill the voids and produce the solid body desired, then clean, coarse sand, free from loam, quicksand or other impurities may be used in the proportions found necessary, and approved by the Engineer in charge.

Mixing Device. The mixing shall be done in a suitable rotary batch mixing machine, made for the purpose of mixing and cooking asphaltic concrete; the paving mixture shall be cooked and stirred together for at least fifteen minutes at a temperature of from 225 to 325 degrees Fahrenheit. The aggregate shall be thoroughly dried in properly designed driers before mixing with the Bitumen.

1. Mixture and Proportions. The mineral aggregate and asphaltic cement shall be mixed in the following proportions:

Bitumen.....	from	7%	to	11%
Mineral Aggregate, passing 200 mesh screen		5%	to	11%
" 40 "	"	18%	to	36%
" 10 "	"	25%	to	55%
" 1/4 inch	"	8%	to	22%
" 1/2 inch	"	less than		10%.

The sieves should be used in the order named and the percentage given in the above table are the extreme limits for the different materials. The City Engineer shall determine the proportions, within these limits, which shall be used on the different streets and the contractor shall at all times use the proportions as directed by the City Engineer. The percentage of bitumen and the 200 mesh stuff shall approximate a mean between the limits on all ordinary work.

The item designated as mineral aggregate passing a 200-mesh screen shall include Portland cement, stone dust, and fine sand. The sand and stone dust shall not exceed 4% of the total mixture, and the stone dust may be entirely eliminated when it is deemed necessary by the City Engineer.

2. The mineral aggregate and asphaltic cement shall be heated separately, to from 225 to 325 degrees Fahrenheit, and mixed in such a manner as to thoroughly coat each particle of stone, gravel or sand and produce a uniform mixture. The asphaltic concrete, prepared as aforesaid, shall then be hauled on to the street, which must be thoroughly dry and free from leaves or other foreign matter, and spread while hot with hot iron, rakes or shovels, and thoroughly rammed or tamped into position in such a manner as to produce, when thoroughly compressed, by tamping and rolling, a thickness of two (2) inches.

No asphaltic concrete shall be spread while the temperature is below 32 degrees F.

3. The asphaltic concrete mixture shall contain enough of mortar to fill all voids and come to the surface of the pavement as free mortar, when rammed and rolled, and produce a solid mass. In case that in the opinion of the Engineer enough mortar does not roll to the surface, a seal coat may be required, applied as directed by the Engineer. As soon as a load has been spread and raked the surface shall be immediately rolled with a hand asphalt roller having a compression of not less than thirty pounds per inch width of wheel base. Portland cement shall then be evenly swept over the surface and the final compression shall be produced with a steam roller weighing at least 20,000 pounds, the rolling to be continued at a rate of not more than 200 square yards per hour, as long as the asphaltic concrete will take any compression.

1. Surface. The finished surface of the pavement shall be even and true, without waves or depressions; that will exceed one-fourth inch when tested with a four-foot straight edge. The rolling shall be continued until it has received its ultimate compression, to the satisfaction of the Engineer in charge, the intention being to produce a solid semi-elastic or malleable asphaltic concrete pavement that will be water-proof and have the

malleability of lead--one that will not be so hard as to be brittle or crack during winter or so soft as to roll, creep or pick up during the summer weather.

2. The proportions of asphaltic cement shall at all times be determined by actual weighing with scales attached to the asphaltic cement buckets. The sand and stone shall also be weighed unless a method of gauging approved by the Engineer shall be used.

3. The paving contractor on asphaltic concrete will be required to give a good and sufficient maintenance bond to the City to the amount of five hundred dollars (\$500.00) per block, conditioned that he shall make all repairs of said pavement free of charge for five years after the date of its acceptance, which may become necessary within that time by reason of any imperfection in said work or material used, or poor or defective workmanship in putting down said material, and by reason of any rotting, crumbling or disintegration of said paving material.

4. At the expiration of the guarantee, the pavement shall have a contour free from depressions of any kind exceeding one-half inch in depth, as measured between two points four feet apart on a line conforming substantially to the original contour of the street. It shall be free from cracks, and shall contain no signs of a

disintegrated surface mixture. It shall not have reduced in thickness more than one-half an inch in any part.

STORM SEWERS.

1. The pipe furnished by the contractor shall be of the best quality of number one Standard vitrified stoneware socket pipes, uniform in texture, and shall be well and smoothly salt-glazed in the best manner over their inner and outer surfaces. All pipes are subject to the approval of the City Engineer. Joints two and one-half feet in length are preferred.

2. The pipe shall conform to the specifications, and shall be of true cylindrical shape, and are to be laid in accordance with the lines and grades given by the Engineer, under the direction of an inspector, and in accordance with the City specifications covering same for building sewers in the City of Topeka.

3. No tunneling will be allowed under any circumstances.

4. The price bid per lineal foot for vitrified pipe shall include the cost of breaking into and closing up manholes.

MANHOLES AND CATCH BASINS.

1. Brick manholes and catch basins shall be built on the streets to be improved as shown on plans.

2. They shall be constructed of the material in accordance with the City's specifications covering same for building sewers in the City of Topeka.

3. All manholes six (6) feet deep or under will be classified as catch basins and will be paid for as such and in accordance with contractor's price for building catch basins.

CEMENT-MORTAR.

1. The cement used shall be of the best quality Portland cement, as called for in these specifications.

2. The mortar shall be made of one part cement and two parts clean sharp sand for brick work, and one part cement and two parts sand for pipe storm sewers.

3. The contractor in addition to his regular bond, shall furnish to the City an excavation bond for \$2,000 to comply with Ordinance No. 2665, to save the City harmless in case of accidents, and as a guarantee that they will repair the excavations any time necessary within a period of two years from the time of the completion of the work.

4. All sewers, basins, etc., to be thoroughly cleaned out before the work is accepted.

SIDEWALKS, NEW AND RELAID.

Where sidewalks either brick or cement are to be relaid, or where new sidewalks, either brick or cement, are to be built, this work shall be done according to the City of Topeka's Sidewalk Specifications, on file in the City Engineer's office.

CEMENT STEPS.

Where cement steps are required, they shall be constructed of concrete, of the proportions called for in the Combined Curb and Gutter Specifications, and shall be of the shape and dimensions determined by the City Engineer.

Steps will be paid for at the price bid per superficial square foot for steps measuring the actual tread and rise of the steps. This price per square foot shall include the side rails.

ARTICLES OF AGREEMENT.

Between, a firm composed of, parties of the first part, and the City of Topeka, party of the second part.

This agreement, made and entered into this day of, by and between
....., a firm composed of
....., parties of the first part, and the City of Topeka, a municipal corporation organized under the laws of the State of Kansas, party of the second part.

1. Witnesseth, That said part..of the first part, for and in consideration of the covenants and agreements of the said party of the second part hereinafter made and contained, for heirs, administrators and assigns, hereby covenants, promises and agrees, to and with said party of the second part, that.....the said part...

of the first part, shall and will furnish all of the materials and do all of the work of whatever kind necessary to construct and complete in a good, substantial and workmanlike manner, ready for use, and in strict accordance with the specifications bound herewith, and made part hereof, and according to the plans and drawings on file in the office of the City Engineer of the said City of Topeka, which are also made part of this contract, the following public improvements in the said City of Topeka, Shawnee County, Kansas, to wit:

Grading, Curbing & Paving.....StSt. toSt.

Grading, Curbing & Paving.....StSt. toSt.

all of said work to be performed and all of said materials to be provided and furnished in conformity with the specifications therefor bound herewith, and the plans thereof on file in the office of the City Engineer, to which reference is hereby made, and also all the written and verbal directions and orders of the City Engineer of the City of Topeka, given for the complete fulfillment of, or in explanation of, said plans and specifications as he, the said City Engineer, shall from time to time make and give during the progress of the work; and it is hereby expressly agreed and understood that all such written and verbal directions shall be obeyed and performed by said part... of the first part as though the same had been fully herein written, and all explanations of said plans and specifications for such work shall be final and con-

clusive.

2. The said part...of the first part further covenant...and agree...that said work shall be commenced within days from the date of this agreement and shall be constantly and vigorously prosecuted, and that the same shall be fully completed to the entire satisfaction of the City Engineer, and in accordance with the plans and specifications and the written and verbal orders and directions of the City Engineer, as aforesaid, and fully completed in all respects on or before the day of

3. The said part...of the first part, doing and performing all and singular the terms and conditions of this agreement herein (by)

agreed to be done and performed, and said party of the second part hereby covenants and agrees to pay to the said part...of the first part or legal representatives therefor the following prices, respectively, for the various materials furnished and labor performed, to wit:

<u>QUANTITIES.</u>		<u>CLASSIFICATION.</u>	<u>WRITTEN PRICE. FIGURES.</u>
...sq.yds.		Asphaltic Concrete	
		4" Concrete Base,	
...sq.yds.		2" Surface	.....
		Asphaltic Concrete,	
		5" Concrete Base,	
...sq.yds.		2" Surface	.....

<u>KIND OF WORK</u>	<u>WRITTEN PRICES.</u>	<u>FIGURES.</u>
...sq.yds.Resurfacing Asph.		
Conc., per cu.yd.
...sq.yds.Remov'g old mat.		
& clean up per du.yd
...cu.yds.concrete,per cu.yd.....
...cu.yds.grading,per cu.yd.
...lin.ft.7 in.Comb.curb &		
gutter,1-yr.guar.,ft.....
...lin.ft.9 in.Comb.curb &		
gutter,1-yr.guar.,ft.....
...lin.ft.curb,1-yr.guar,ft.....
...lin.ft.cement gutter,ft.....
...lin.ft.curb reset,lin.ft.....
...lin.ft.manholes,new,ft.....
...catch basins,new,each.....
...lin.ft.8 in.Vit.ClaySew-		
er Pipe,per lin.ft.....
...lin.ft.10 in.Vit.Clay Sew-		
er Pipe, per lin.ft.....
...lin.ft.12 in.Vit.Clay Sew-		
er Pipe,per lin.ft.....
....lin.ft.15 in.Vit.Clay Sew-		
er Pipe,per lin.ft.....
...lin.ft.18 in.Vit.Clay Sew-		
er Pipe,per lin.ft.....
...lin.ft.21 in.Vit.Clay Sew-		
er Pipe,per lin.ft.....
...sq.ft.new cement walk,sq.ft.....
...sq.ft.new brick walk,sq.ft.....
...sq.ft.cem.walk taken up &		
relaid,sq.ft.....
...sq.ft.brick walk taken up		
& relaid,sq.ft.
...sq.yds.old pavem't,sq.ft.....
...lin.ft.manholes raised,		
per lin.ft.
...lin.ft.manholes lowered		
per lin.ft.
...lin.ft.catch basins rais-		
ed,per lin.ft.
...lin.ft.catch basins low-		
ered,per lin.ft.
...lin.ft.inlets raised,ft.....
...lin.ft.inlets lowered,ft.....
...ft.cement steps,all sizes,		
per superficial ft.
...du.yds.broken stone or		
gravel,per cu.yd
...cu.yds.sand,per cu.yd
.....

The said part...of the first part further covenants and agrees, that the City of Topeka may deduct and retain four (4) per cent of the entire contract price of construction of said public improvements, as stated in this proposal, from said contract price, to pay the cost and expense of engineering, superintending, inspecting, appraisment, printing, advertising, and all incidental expenses connected with or relating to the construction of said public improvements which have or may be incurred by said City, and may pay such incidental expenses as aforesaid, and deduct the same from the estimates made by the City Engineer.

4. It is hereby further agreed that all the public improvements herein contracted for shall be constructed of the materials described, and of the dimensions shown on the plans and specifications prepared for each particular case.

5. Also, that no extra or customary measurements of any kind will be allowed in measuring the work under this contract the actual length, width, depth, area, solid contents, or number, in accordance with the specifications herewith, shall only be considered and the length shall be measured on the center lines of the work, whether straight or curved. No extra labor or material, or extras of any kind, will be allowed nor paid for unless ordered in writing by the City Engineer, specifically describing the same, and the price for such agreed upon

in advance; and all claims for extra labor or materials, or for damages, or for any other matter or thing whatever for which the contractor may consider himself entitled to extra remuneration, must be made in writing and filed with the City Clerk within five days after the extra labor or materials are furnished, or within five days after the damages occur, or the cause for the claim arises; and no claim will be considered or paid which has not been so ordered and so presented. And the contractor hereby specifically waives any and all claims for labor, material or for damages which have not been ordered and claimed and demanded within the time and as herein provided.

6. The whole of the labor and materials of every description necessary to carry out and complete the work provided for in this contract, shall be furnished by the contractor, at his own expense; and the whole of the said work must be executed to the full satisfaction of the Engineer in every respect.

7. No materials of any kind shall be used until they have been examined and approved by the Engineer, who shall have full power to condemn any work or materials not in accordance with this specification, and to require the contractor to remove any work or materials so condemned, and at his own expense to replace the said work

or materials to the satisfaction of the Engineer. In case the contractor shall neglect or refuse, after written notice by the Mayor and Board of Commissioners to remove or replace said rejected work or materials, they shall be removed and replaced by the order of the Mayor and Board of Commissioners at the contractor's expense, which shall be deducted from the first estimate, or any other estimate, thereafter.

And it is agreed that the acceptance of work and material will not be final and conclusive in any respect until the completion of the work and the Engineer's final estimate is approved by the Mayor and Board of Commissioners.

8. The right is expressly reserved by the Mayor and Board of Commissioners of the City of Topeka to order the omission of any portion of the work or materials called for by the plans and specifications, or to order any addition thereto, or to make any alteration whatever in the nature of the work or materials called for therein, provided the said order be in writing, and the amount of compensation to be added or deducted from the contract price, for such addition or omission shall be determined and fixed by a written agreement between the contractor and the Mayor and Board of Commissioners; and in case they should fail to agree upon the amount to be so added or deducted, then the amount shall be deter-

mined by the City Engineer of said City, whose decision, in writing, shall be accepted as final and binding upon both parties. And it is expressly agreed and understood that such alteration, addition or omission shall not in any way violate or annul the contract; and the contractor hereby agrees not to claim or bring suit for any damages, whether by loss or profits or otherwise, on account of not being allowed to do such work, or furnish such materials.

9. Bidders must examine for themselves the location of the proposed work, and exercise their own judgment as to the nature of the excavations to be made, and the whole of the work to be done; and the contractor agrees fully to complete said work in accordance with the plans and specifications, for the prices herein specified.

10. It is also understood, that in case of failure to execute the work, or furnish materials, in accordance with the plans and specifications, to the satisfaction of the City Engineer, Mayor and Board of Commissioners, or to proceed with the same rapidly enough in the estimation of the City Engineer, Mayor and Board of Commissioners, to secure its completion within the time allowed by the contract, then it shall be lawful for the Mayor and Board of Commissioners of said City (after giving three days' written notice of their intention so to do, by serving the notice on the contractor, or his agent or foreman on the work, and if there be more than

one person contracting to do said work, then by such service upon either of them), to employ any other person or persons, either by contract, day's work, or otherwise, to proceed with said work and complete the same; and to charge all sums paid such person or persons as so much money paid to the contractor. And if the sum so paid shall exceed the sum due the contractor under his contract, then the said contractor shall become liable to the city for any sum by which the expense of so doing the work shall exceed the sum due under his contract, as liquidated damages, and not by way of penalty, and the Mayor and Board of Commissioners may annul and determine the contract, which shall thereupon become null and void, except as to any right of action which may accrue to said City, by reason of the neglect of the contractor to do the work in the time and manner prescribed by the contract and these specifications; nor shall such action in any manner annul, vitiate, or in any way affect the validity of the bond given by said contractor for the faithful performance of this contract. And said contractor further agrees that all work heretofore done, at the time the contract is so declared void, shall at once pass to and become the property of said City, without any payment therefor, and covenants that he will not make any claim or bring any suit for the value of such work or materials.

11. The contractor will not be allowed to sub-let the whole, or any part of his work, or make an assignment of this contract or of any moneys to be paid to him; and should this provision be violated, said assignment or sub-contract shall be void, and sufficient reason for the Mayor and Board of Commissioners, at their option, to end and determine this contract.

12. The contractor shall dismiss from the work any employee who may, in the opinion of the Engineer, be considered guilty of misconduct or neglect of his duties, or perform his work in an improper manner.

13. The contractor will be required to remove, at his expense, any and all obstructions, whether old stone, brick or wooden sewers or logs, filth or refuse of any kind, that may be encountered in the line of his work, and which may be required to be taken out in order to construct the new work. All castings, gutter and manhole plates, pipe and other material along the line of the work, shall be taken out and removed by the contractor, and will become the property of the city.

14. It is also agreed that the price stated in the bid of the contractor must include all labor and materials, pumping or bailing, with all other costs incidental to the proper completion of the work; the prices for manholes, catch basins, and pipe will include all

labor and materials necessary to make said public improvements complete; and the contractors must determine for themselves the character of the excavation, and no extra allowance will be made for any class or condition of material outside of the contract price. It is the intention that there shall be no extra bills of any nature whatever associated with the perfect construction of the public improvements herein contracted for. And the contractor and his sureties will not be released from any liability until thirty days after the final estimate of the Engineer is given, and the work accepted by the Mayor and Board of Commissioners. In case the contractor, after five days' written notification by the Mayor and Board of Commissioners, shall refuse or neglect to keep his work in repair, while the same is progressing and prior to the completion of this contract, as above specified, the city shall have the right to make the repairs, by days' labor or otherwise, at the contractor's expense, and the cost of said repairs shall be recoverable from the contractor or his sureties, as liquidated damages, and may be deducted from any moneys due or to become due under this contract.

15. The contractor will be required to use, throughout the work, materials as good in every respect as the samples on exhibition in the Engineer's office.

16. In case of any of the public improvements con-

structed under these specifications and this contract shall intersect any culverts, sewers, drain pipes, or house connections previously existing and still in use, so much of the said culverts, sewers, drain pipe, or house connections as may, in the opinion of the Engineer, be necessary, shall be taken up and rebuilt, relaid or extended, as the case may require, so as to connect in a proper manner with the sewer. All old sewers, culverts or drain pipes on or near the line of the work that are rendered useless by the construction of the said public improvements, must be taken out, or filled solidly with good earth, well rammed, as the City Engineer may decide; and the price for this work shall be determined in the manner provided in these specifications.

17. Whenever the contractor fails to complete the work as herein specified within the time named, he shall be liable for the wages of the inspectors on his work, from the above specified time to the date of the Engineer's final estimate, made after the completion of his work; and the amount of such wages shall be deducted from any moneys which may be due to him from the city, then the said amount shall be recoverable from the contractor or his sureties.

18. It is understood and agreed that the whole of the work under these specifications and this contract

is to be done at the contractor's risk; and he is to assume the responsibility and risk of all damages to the work, or to property on the line of said work, which may be occasioned by floods, backwater, caving of the street, settling of the foundations of buildings, or from any other causes whatever; to hold the City harmless therefrom, and any damages or suits for damages for which the City may become liable shall be secured to the City by deducting the amount from the next estimate of the Engineer, or from any moneys due for work performed under this contract, or from the contractor or his sureties.

19. Anything omitted in the specifications or plans necessary to fully complete the public improvements herein contracted for in a workmanlike manner, which may be fairly implied, shall be done by the contractor without cost to the city.

20. To prevent disputes and litigation, the City Engineer shall in all cases determine the amount or quality of the several kinds of work which are to be paid for to the contractor and he shall decide all questions which may arise relative to the execution of the contract on the part of the contractor, and his estimates and decisions shall be final and conclusive.

21. The City of Topeka will retain ten (10) per cent of the entire cost of the improvements herein provided

for from any and all moneys due, or to become due, the contractor from said City under this contract, on each and all of the monthly estimates made or to be made by the City Engineer, it being fully understood and agreed that ten (10) per cent of the entire contract price of the improvement herein provided shall be withheld, and shall not be due to the contractor until thirty days after the completion of this contract by said contractor in all its parts; and the acceptance of said public improvements by the Mayor and Board of Commissioners. And it is further agreed, that if at any time before the completion of this contract as aforesaid it shall become necessary for any reason or cause whatever to in any manner make any repairs of any of the work, material or the improvement herein provided for, or any part thereof, the party of the second part shall have the right, power, and authority to make, or cause to be made, any and all such repairs at the cost and expense of said party of the first part, and to deduct the amount of the cost and charges therefor out of said ten (10) per cent so retained as aforesaid; and in case said ten (10) per cent is not sufficient, may recover any balance from the contractor and his sureties.

22. On all artificial stone curbing and combined curb and gutter, the contractor will be required to give a good and sufficient maintenance bond to the City of To-

peka to the amount of \$300.00 per block, conditioned that he shall make all repairs of said artificial stone curb, or combined curb and gutter, free of charge for a period of one year after the date of its completion and final acceptance by the Mayor and Board of Commissioners which may become necessary within that time by reason of any imperfection in said work or material used, or poor or defective workmanship in putting down such material.

23. On all asphaltic concrete pavement, the contractor will be required to give a good and sufficient maintenance bond to the City of Topeka to the amount of five hundred dollars (\$500.00) per block, conditioned that he shall make all repairs of said pavement free of charge for five years after the date of its acceptance by the Mayor and Board of Commissioners, which may become necessary within that time by reason of any imperfection in said work or material used, or poor or defective workmanship in putting down said material, and by reason of any rotting, crumbling or disintegration of said paving material.

24. It is further agreed, that time shall be an essential element of this contract in all its parts, and the contractor shall forfeit to the City of Topeka the sum of ten dollars per day in addition to penalties provided in Sec. 17, as and for liquidated damages for each and every day the work herein provided for remains

unfinished, and this contract uncompleted, after the time specified herein for the completion of the same; and said ten dollars per day so forfeited as aforesaid, shall be deducted out of any money due or to become due to said contractor under any of the provisions of this contract; and should there not be a sufficient amount due, as aforesaid, then the same may be recovered in an action against the contractor and his bondsmen; Provided, That if the completion of this contract be delayed by suit, the same shall operate as an extension of the time for the completion for a corresponding period.

25. The City Engineer of the City of Topeka shall, every thirty days during the progress of this contract, make an estimate of the amount of all work done on said public improvements, and report the same to said party of the second part, and thereupon said party of the second part shall make payment to said part...of the first part as aforesaid, to the amount of ninety (90) per cent of each of said estimates, and payments to be made in internal improvement bonds of said City at par, or in cash, as the Mayor and Board of Commissioners may elect. No estimates for material on hand will be allowed, nor for paving base on unfinished paving.

26. Provided, and it is hereby expressly agreed and understood, That in no event shall the making of any of said payments be construed as an acceptance of all or

any part of the work embraced in this agreement.

27. Said party of the second part further agrees that upon the entire and complete fulfillment of all and singular the terms and conditions of this agreement by said part...of the first part, and the entire completion of said work, and upon the acceptance of said work by said party of the second part, as provided in the specifications bound herewith, the said party of the second part will pay to said part...of the first part as aforesaid, all balance or balances due for said work as herein provided.

28. It is hereby expressly agreed and stipulated that no sub-contract or piece work shall be let by said part...of the first part for any of the work required to be done by this agreement.

29. It is further expressly agreed and understood, that each and every one of the terms, conditions, stipulations, specifications and proposals bound herewith, also the plans and drawings made therefor, on file in the office of the City Engineer of said City, shall be, and are hereby, made a part of this agreement, as though the same were specifically herein written.

30. It is further expressly agreed and understood, that the said part...of the first part shall save and hold harmless the said party of the second part from any and all damages, costs and expense, of every kind,

character and nature whatsoever accruing upon or about said works, or in consequence of the same being done or constructed, for the payment of which said party of the second part may become liable, whether the same is occasioned by the negligence of said part...of the first part or otherwise.

31. It is further expressly agreed and understood, that all fees for any patent invention, article or arrangement that may be used upon or in any manner connected with the construction of the work embraced in this contract, or any part thereof, shall be included in the price stipulated in this contract for said work, and the said part...of the first part shall save and hold harmless the said party of the second part against any and all demands and claims of all kinds and nature whatsoever for such fees, and before the final payment and settlement is made on account of the contract herein, the said part...of the first part must furnish the said party of the second part with a proper and satisfactory release from any and all such claims or demands.

32. Said part...of the first part further expressly covenant...and agree...to do everything required to be done by the specifications hereunto attached and made part of this agreement, and refrain from doing everything forbidden by such specifications; and that the power reserved to or conferred upon any person in said

specifications may be exercised by such person, and the right shall be reserved to the City of Topeka to order the omission of, or addition to, any portion of the work or materials called for by the plans and specifications, or to make any alterations whatever in the nature of the work or materials therein, provided the said order be in writing; and further agrees, that the amount of compensation to be paid them for any additional work shall be at contract prices if such additional work shall be of a class provided for in the bid and contract; and in case any portion of the work is omitted, that they will waive all claims for damages, and will not demand any pay for the portion so omitted, and a reduction shall be made in the contract rate in the amount herein agreed to be paid. In case the contractor shall be required to do any work of a class not provided for in the bid and contract, they still further agree that the amount to be allowed them shall be fixed by a written agreement between the contractor and the Mayor and Board of Commissioners of said City, before such work is begun; and in case they should fail to agree upon the price to be allowed for such work, then the same shall be fixed by the City Engineer of said City, whose decision, in writing, shall be final and binding.

33. The part...of the first part especially agree... that the Mayor and Board of Commissioners of said City, of the City Engineer of said City, may cause any work or

materials not in accordance with the specifications or contract, to be taken up, removed and relaid at their expense; and further agrees to be bound by all the terms of the specifications.

34. In no case shall the contractor be entitled to claim or receive any pay beyond the contract price, nor any damages whatever.....
.....

IN WITNESS WHEREOF, The said part...of the first part ha...hereunto set hand...,and the Mayor of the City of Topeka has hereunto signed this agreement on behalf of the said party of the second part as such Mayor, and said party of the second part has caused these presents to be attested by its Clerk, and the seal of said City to be hereto attached, this day of
.....,

.....
Part...of the First Part.

THE CITY OF TOPEKA,
Party of the Second Part.

By.....
Mayor of the City of Topeka.

Attest:
City Clerk of the City of Topeka.

BOND.

KNOW ALL MEN BY THESE PRESENTS:

That We, a firm
composed ofas principal,
and as surety,
are held and firmly bound unto the City of Topeka, a
municipal corporation organized and existing under
the laws of the State of Kansas, in the sum of
..... Dollars,
lawful money of the United States, well and truly to
be paid to the City of Topeka, its successors or as-
signs, to which payment we hereby bind ourselves, our
heirs, executors, administrators, successors and as-
signs, jointly and severally, firmly by these presents.

THE CONDITION of the above obligations is such
that whereas the said.....
ha...on this day of,19...,entered
into a written contract with said City for the construc-
tion of certain public improvements in said City, con-
sisting of
.....
which said public improvements are specifically describ-
ed and designated in said contract and are to be con-
structed in strict accordance with the terms and condi-
tions of said contract and specifications which are
bound herewith and the plans and drawings therefor on

file in the office of the City Engineer of said City.

Now, Therefore, if the said
shall honestly and faithfully discharge, perform and
fulfill, all and singular, the terms and conditions of
said contract and specifications bound herewith, and
shall save and hold harmless the said City of Topeka
from any and all costs charges, liens for labor and ma-
terial, loss arising from fraud or overcharges and dam-
ages of every kind and nature whatsoever arising out of
said contract in any manner, then this obligation shall
be void, otherwise it shall be and remain in full force
and effect.

IN WITNESS WHEREOF, We have hereunto set our
hands this day of, 19....

.....
Principal.

.....
Surety.

Attest:

By

INSTRUCTIONS TO INSPECTORS.

The following list of instructions gives a brief summary of what our inspectors are required to observe:

EXCAVATION.

1. Secure a set of specifications.
2. Read the specifications, noting all the requirements.
3. Observe at all times, all of the conditions of the stipulations in specifications.
4. Permit no deviations from the stipulations in the specifications.
5. Be on the job all the time; know the meaning of the engineer's stakes and see that the work is done according to these stakes.
6. See that public and private property is properly protected.
7. Do not allow contractor to plow or scrape too deep, it will cause him grief if he does.
8. Do not allow contractor to leave tools or material in such shape as to be a menace to public safety at any time.
9. See that all tools are carefully and neatly stored when not in use.
10. Insist that all crossing material be removed to city yards as soon as they are taken up. Do not permit careless handling of such material, as contractor will be held responsible for any such material, damaged in

handling.

11. All excavated material must be deposited where directed by the Engineer.

12. Inspector has no authority to sell excavated material. He will refer all persons desiring dirt to the office engineer, who will make all contracts for dirt delivery.

13. Deliver no dirt without an order from the office engineer.

14. New work shall be opened up as ordered by the Engineer.

15. Do not permit contractor to leave any piece of work until it has been checked by the inspector and found to be finished.

16. Do not allow any dumping in streets or alleys or on private dumps unless sufficient number of spreaders are provided to keep dump properly graded.

17. Do not ask teamsters to dump in impossible places. Deliver no dirt to parties unless they provide a safe dump.

18. Give all orders to the foreman in charge of the work. Do not interfere with the working of the men in any way.

19. Have foreman remove any man who persists in being profane, or indecent or who is careless or incompetent.

20. Be courteous to all persons, especially citizens along the line of work.

21. Keep accurate account of all excavated material and fill out daily report cards fully. Make special note of anything unusual in the day's work.

22. Report promptly to the Engineer any damage to public or private property and any accident that may befall person or animals.

23. Notify immediately, any property owner whose sewer, gas or water pipe interferes with the progress of the work; also notify the Engineer.

24. Do not allow excavated material to be scattered on pavements or walks; should there accidentally be any excavated material so scattered, insist that it be cleaned away before the force quite work for the day.

25. Should the foreman refuse to obey your orders, suspend work immediately and send for the Engineer.

26. Concerning any point about which you are in doubt, consult the Engineer.

27. On park grading, insist on neat work using a straight edge when necessary. Have contractor use template on finished sub-grade; foreman to use his own judgment as to amount to allow for settling in rolling.

28. Do not visit; you cannot keep your mind on your work and be an entertainer at the same time. Say no

more than is absolutely necessary for the proper direction of the work but insist that your direction be followed.

CONCRETE WORK.

1. Secure a copy of the specifications and plans, for the particular work that you are inspecting, and keep them with you for reference.
2. Make a close study of the specifications, noting all the requirements, and become thoroughly familiar with all of the details of the plans.
3. Watch all of the material all of the time, allowing no material to go into the work that does not meet the requirements of the specifications.
4. Do not allow any concrete put in on sub-grade that has not been properly prepared.
5. Check the proportions often enough to be sure that the mix is absolutely right. Do not hesitate to call the foreman's attention to the fact that the proportions are not right, having him increase the amount of aggregate, if using too much cement, and decrease it if not using enough.
6. Have the material delivered to the machine so that you can have a positive check on number of cubic feet of sand and stone that are used in each batch.
7. Always use full sacks of cement in each batch, counting one sack as one cubic foot, and then use sand and broken stone according to specifications.

8. Report each day the actual number of sacks of cement used. This report MUST BE ACCURATE. Do not rely on counting sacks at the close of the day as such a report will not be accepted. If you cannot determine exactly how many sacks are on the work in the morning, how many are delivered during the day, and how many remain in the evening, keep accurate count of the number of batches mixed during the day and the number of sacks in each batch.

9. Do not allow any batch to leave the mixer that is not properly and thoroughly mixed.

10. Have the concrete incorporated in the forms, or spread on the work, immediately after it is mixed.

11. See that the concrete is properly spread, and thoroughly compacted. Do not allow any dirt to get into the concrete.

12. If on curb work, or walk, see that the forms are true to line and grade and thoroughly braced so that they will not shift or bulge while concrete is being tamped. Always insist on first class forms, put up in the best possible manner. Insist on templates being firmly secured, truly vertical and at right angles to the form boards.

13. Have the concrete properly cut down with suitable cutting tool, along both back and front form boards, and thoroughly rammed with suitable tamp. Have an edger of

proper radius run along edges immediately after finishing tamping.

14. Do not allow form boards removed until concrete is set up enough to stand, and have care exercised in removing forms so as to leave concrete in perfect condition to receive facing coat.

15. Have finishing coat applied to body as soon as forms are removed. Do not allow body to stand long enough to become dry before applying facing.

16. Have a thin coat of facing mortar thoroughly rubbed into the body concrete before the main facing coat is applied, then run on the facing and see that it is thoroughly trowled to a true even surface with the pores all closed and no trowel marks showing. Insist on a neat finish true to line and grade and the surface showing the artistic workmanship of a skilled mechanic.

17. Have any stone resurfaced which shows any defects in finish, provided it can be resurfaced while the body is still green. If the body has taken final set, have whole stone removed and replaced with new stone.

18. See that all joints are clean cut and open to their full depth and that an expansion joint, not less than one-half inch in width, is left not farther apart than one in every one hundred feet.

19. Insist that finish work be properly protected at all times. It is the contractor's duty to protect his work from both the elements and from people, animals, etc.

He should have on the work, at all times, enough water proof canvas to protect green work from rain or excessively hot winds, and should barricade against people, animals, etc., and if that is not sufficient, should furnish watchmen.

20. Any work that is defective from any cause whatsoever is to be removed at once, so do not allow contractor to proceed with new work until all defective work is made good.

21. On concrete base, carefully check the sub-grade and see that it is right before any concrete is spread. Suspend work if sub-grade is not right as you cannot secure results by grading just in front of the concrete.

22. Insist on getting the full thickness of concrete in all places. Use stakes or pins to grade by and check the finished surface by templates to see that it is at the proper elevation. Insist that the finished surface conform accurately to the required cross section of the pavement base.

23. See that concrete is properly dumped and spread, and that it is thoroughly compacted and finished to a smooth even surface. If spots show rough and stone project, have such spots retouched with mortar. Do not allow too wet a mix to be used nor a mix with an excessive amount of sand in it.

24. Have contractor keep the mortar, that slops out

when mixer is dumped, cleaned up. Do not allow it to accumulate but have it cleaned up at every dumping of the mixer.

25. Insist that each man be proficient in the particular kind of work that is assigned to him. Do not allow any slovenly work to pass. Nothing but the best that can be turned out will be accepted.

26. Have foreman dismiss permanently from the work, any one who is incompetent, untrustworthy, vulgar, pro-face, or who refuses to follow instructions.

27. If foreman refuses to follow instructions of inspector, or to follow specifications, suspend work and send for the Engineer.

28. Do not allow any deviations from the specifications. They were written to cover the particular work which you have incharge and must be observed to the letter.

29. See that public and private property is properly protected.

30. Do not allow contractor to leave tools or material in such shape as to be a menace to the public safety at any time.

31. See that all tools are carefully and neatly stored when not in use.

32. Give all orders to the foreman in charge of the

work. Do not interfere with the working of the man in any way.

33. Be courteous to all persons especially to citizens along the line of the work.

34. Report promptly to the Engineer any damage to public or private property.

35. Concerning any point about which you are in doubt, consult the Engineer.

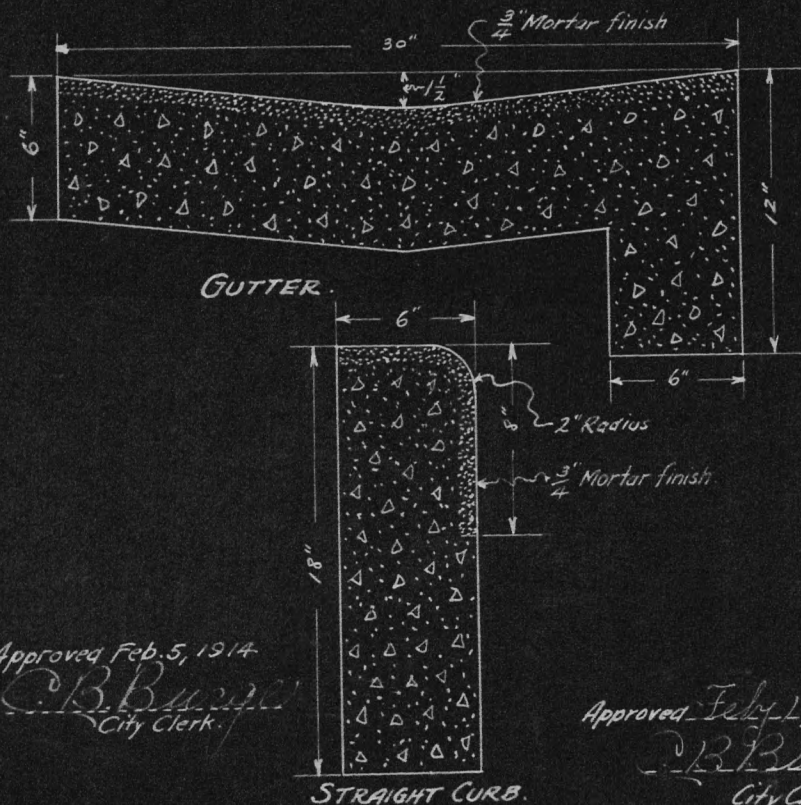
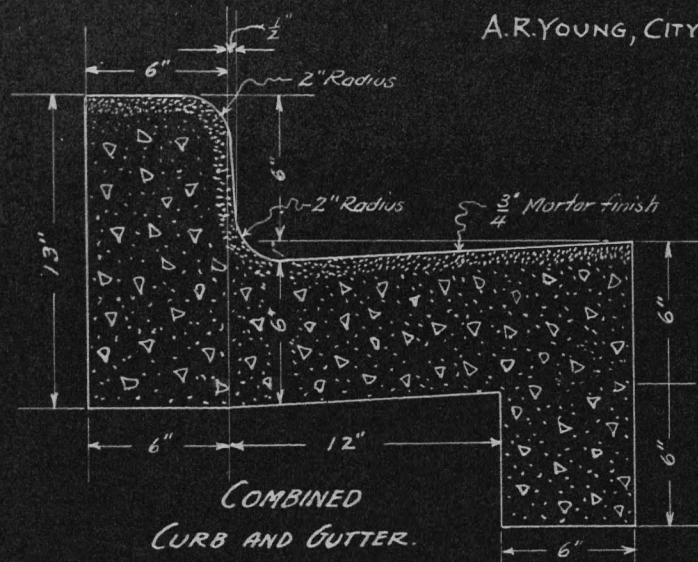
36. Say no more than is absolutely necessary for the proper direction of the work, but insist what you say be observed.

37. Be sure that your daily reports are accurate and turn them in daily.

38. Try to see personally that everything is properly done and always keep in mind the goal for which we are all striving, the best possible work that can be produced, by observing to the letter, all of the stipulations and conditions in the specifications.

CURB SECTIONS.

A.R. YOUNG, CITY ENG.



Approved Feb. 5, 1914

C.B. Burge
City Clerk.

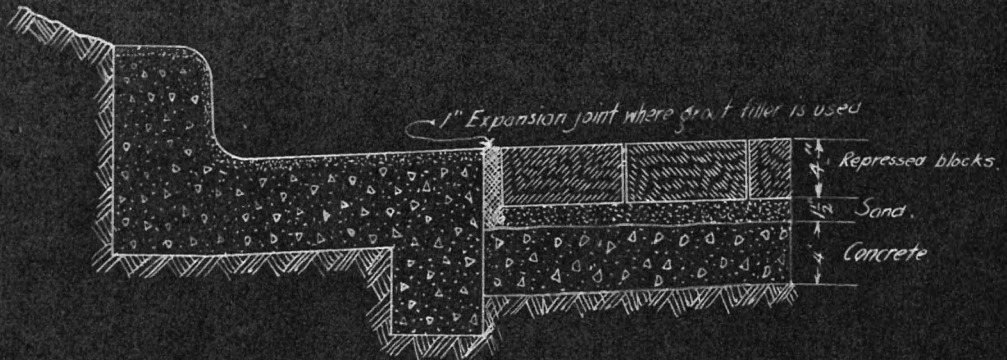
Approved Feb. 17, 1913

C.B. Burge
City Clerk.

PAVEMENT

SECTIONS.

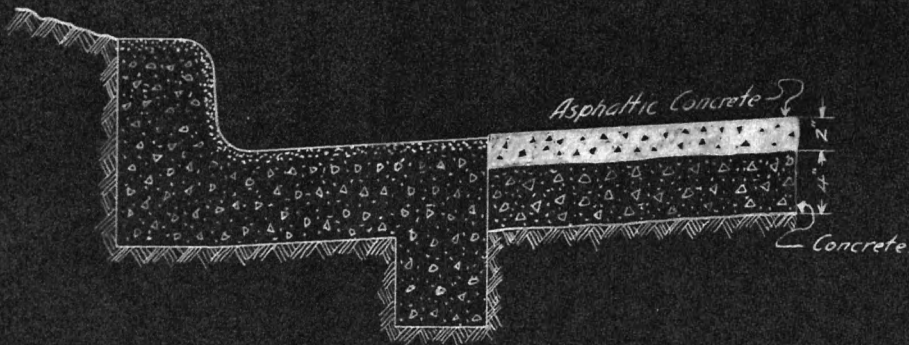
A R. YOUNG, CITY ENG.



VITRIFIED BLOCKS ON CONCRETE BASE.

Crown 26' pavement 5"

Crown 30' pavement 6"



ASPHALTIC CONCRETE ON CONCRETE BASE.

Approved Feb. 5, 1914.

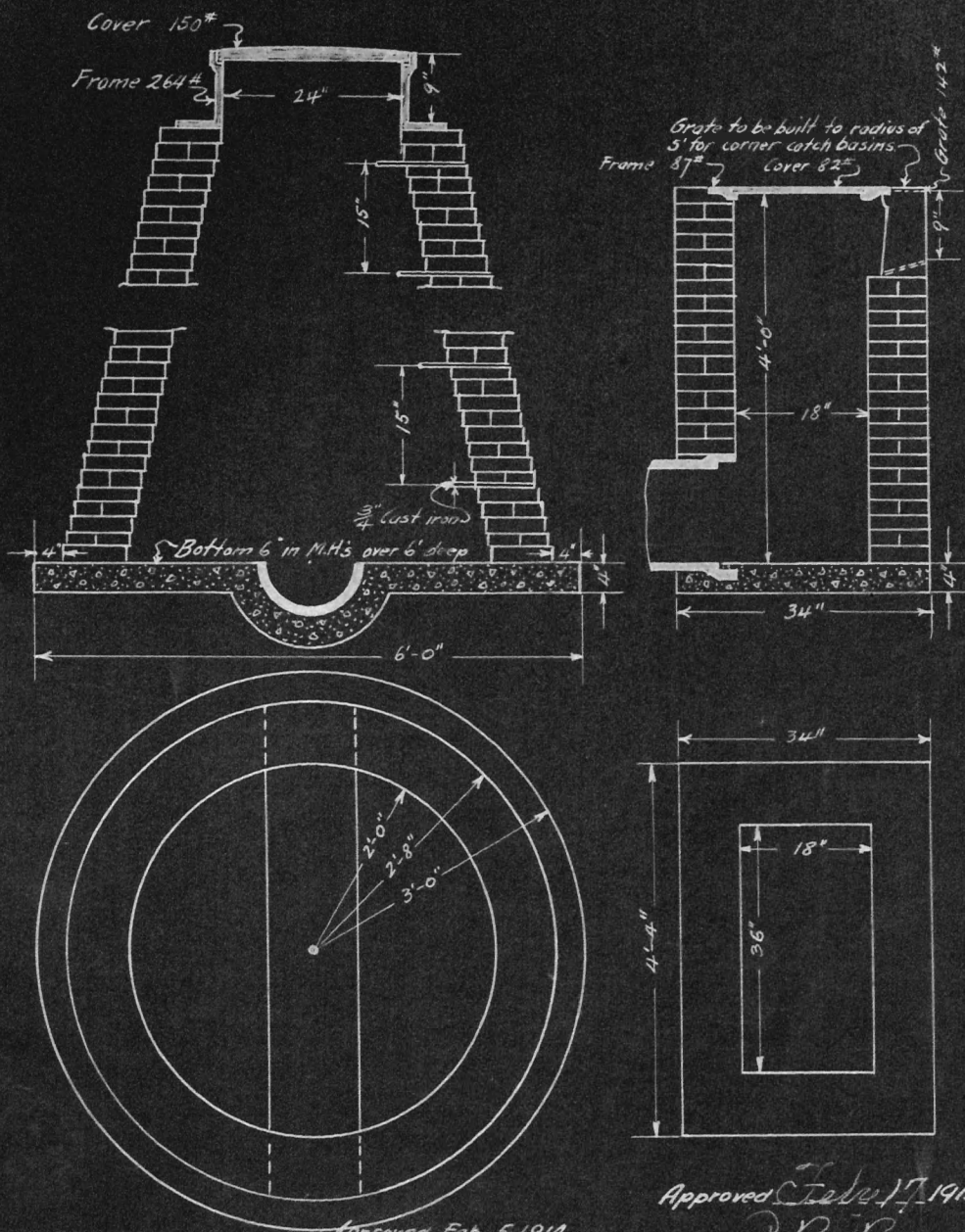
C. B. Burge
City Clerk.

Approved Feb. 17, 1913.

C. B. Burge
City Clerk.

MANHOLE AND CATCH BASIN.

A.R. YOUNG, CITY ENG.



Approved Feb. 5, 1914.

B. B. Burge
City Clerk

Approved Feb. 17, 1913.

B. B. Burge
City Clerk